1-Hydroxypyrene

Metabolite of pyrene (CAS No. 129-00-0)

Pyrene is commonly found in PAH mixtures, and its urinary metabolite is used as a surrogate marker for exposure to PAH chemicals in general. The 1-hydroxypyrene metabolite was detected in 99% of the NHANES 1999-2000 subsample. The geometric mean level for the overall population is similar to that of other general populations residing in an urban setting (Goen et al., 1995; Chuang et al., 1999). People living in one urban setting had severalfold higher urinary 1-hydroxypyrene levels than those who lived in a rural setting (Goen et al., 1995). The sources of PAH exposure in the urban setting include industrial and automobile exhaust (Jongeneelen et al., 1994; Kanoh et al., 1993). An additional source of PAH exposure is the use of coal for domestic heating. Women residing in an urban setting and using coal to heat their homes had higher urinary 1-hydroxypyrene levels than the women in this NHANES 1999-2000 subsample (Gundel et al., 1996). Tobacco smoking can be a more significant source of PAHs than urban exposures or road construction exposure (Goen et al., 1995; Szaniszlo et al., 2001). People who work in certain occupations (e.g., carbon electrode production) can have urinary 1-hydroxypyrene levels 100 times higher than the geometric mean level shown in this *Report* (Goen et al., 1995). An additional source of PAH exposure for children is the ingestion of PAH-contaminated soil.

Table 58. 1-Hydroxypyrene

Geometric mean and selected percentiles of urine concentrations (in ng/L) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	79.8 (69.0-92.2)	14.9 (11.7-18.6)	34.7 (27.4-41.6)	78.0 (67.8-92.8)	187 (161-229)	434 (371-506)	730 (551-940)	2312
Age group								
6-11 years	90.8 (72.2-114)	20.8 (14.8-39.8)	57.0 (39.8-70.7)	94.1 (77.9-124)	170 (124-229)	300 (206-405)	419 (293-757)	310
12-19 years	105 (85.0-129)	24.1 (18.9-33.5)	48.0 (38.7-61.0)	108 (78.1-141)	226 (171-290)	473 (317-618)	642 (425-1200)	693
20 years and older	74.8 (64.0-87.4)	13.6 (9.90-16.3)	30.7 (24.3-36.7)	70.1 (62.2-85.0)	187 (156-233)	446 (366-570)	795 (570-977)	1309
Gender								
Males	90.1 (76.0-107)	18.0 (12.7-23.5)	37.1 (28.4-48.5)	85.2 (72.9-101)	227 (178-284)	496 (404-596)	747 (570-1050)	1106
Females	71.2 (61.6-82.3)	13.5 (9.40-15.8)	32.1 (26.2-37.3)	70.9 (63.3-86.1)	163 (149-197)	361 (278-451)	669 (387-940)	1206
Race/ethnicity								
Mexican Americans	74.2 (64.5-85.4)	16.3 (14.3-19.7)	34.0 (29.9-39.6)	68.1 (58.9-82.8)	161 (120-225)	344 (270-468)	545 (413-650)	766
Non-Hispanic blacks	108 (87.0-135)	20.8 (17.6-24.0)	46.6 (34.5-59.0)	99.7 (74.8-148)	245 (199-358)	586 (420-778)	839 (569-1380)	528
Non-Hispanic whites	73.7 (61.1-88.9)	13.8 (8.50-17.6)	31.9 (23.9-40.1)	72.9 (62.8-87.7)	178 (153-229)	399 (324-506)	747 (451-977)	831

Geometric mean levels of the demographic groups were compared after adjustment for the covariates of race/ethnicity, age, gender, urinary creatinine, and log serum cotinine. Children aged 6-11 years had about a two times higher urinary 1-hydroxypyrene adjusted geometric mean than did people in the two other age groups. This age-related difference also has been found by other investigators (Heudorf et al., 2001; Chuang et al., 1999). The urinary 1-hydroxypyrene levels for children documented in this *Report* are similar to levels measured in other studies (van Wijnen et al., 1996; Chuang et al., 1999; Heudorf et al., 2001; Kanoh et al., 1993). No differences were observed for race/ethnicity or gender. In previous investigations (Roggi et al., 1997; Kanoh et al., 1993; van Wijnen et al., 1996), gender did not influence urinary 1-hydroxypyrene levels. It is unknown whether differences in age groups represent differences in exposure, body-size relationships, or metabolism. Further research on the contribution of tobacco smoke to levels of 1-hydroxypyrene levels is needed.

Table 59. 1-Hydroxypyrene (creatinine adjusted)

Geometric mean and selected percentiles of urine concentrations (in ng/gram of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	74.2 (64.1-85.9)	18.2 (14.6-22.4)	36.5 (30.0-41.9)	73.3 (63.4-83.8)	158 (139-178)	362 (282-416)	500 (438-607)	2312
Age group								
6-11 years	94.1 (76.9-115)	31.6 (13.1-46.5)	56.5 (45.7-65.6)	91.2 (82.1-107)	168 (124-237)	333 (231-486)	474 (332-849)	310
12-19 years	71.5 (60.4-84.5)	21.0 (14.9-29.1)	36.5 (30.9-46.8)	70.7 (56.0-89.8)	137 (119-170)	240 (184-380)	413 (236-663)	693
20 years and older	72.3 (61.6-84.8)	17.2 (12.5-21.5)	33.5 (27.5-40.0)	68.8 (59.5-81.5)	159 (135-182)	377 (288-441)	541 (447-633)	1309
Gender								
Males	72.1 (60.0-86.7)	16.1 (9.59-22.2)	32.6 (25.6-42.9)	69.9 (61.0-84.3)	167 (134-185)	349 (273-416)	525 (412-709)	1106
Females	76.1 (66.2-87.6)	19.9 (17.0-25.9)	37.8 (33.1-42.1)	77.2 (61.7-86.6)	148 (129-178)	370 (256-450)	500 (434-607)	1206
Race/ethnicity								
Mexican Americans	68.2 (59.3-78.4)	21.5 (19.7-25.6)	36.1 (31.2-39.5)	59.6 (52.4-71.5)	124 (97.9-152)	252 (203-333)	462 (325-557)	766
Non-Hispanic blacks	70.5 (56.6-87.9)	16.1 (12.6-19.3)	30.3 (25.0-41.2)	68.6 (54.4-92.7)	156 (113-184)	346 (232-441)	474 (338-847)	528
Non-Hispanic whites	73.2 (60.8-88.1)	17.4 (10.4-23.5)	34.4 (28.2-42.1)	72.3 (59.9-85.7)	163 (130-188)	377 (269-450)	547 (447-633)	831